Summaries

UDC 681.5

Zamyatin S.V., Sukhodoev M.S., Gayvoronskiy S.A.
ARRANGEMENT OF DOMINANT POLES LOCALIZATION AREA IN INTERVAL SYSTEM OF AUTOMATIC CONTROL IN SPECIFIED TRUNCATED SECTOR

Characteristic polynomial of automatic control system has been considered. Its coefficients contain linearly entering interval parameters of control object and controller adjustable parameters. The technique of determining controller tunings supporting specified root quality indices of interval system was developed. The numerical illustration is given.

UDC 681.5

Sukhodoev M.S., Gayvoronskiy S.A., Zamyatin S.V.
PARAMETRIC SYNTHESIS OF LINEAR CONTROLLER IN INTERVAL SYSTEM WITH GUARANTEED ROOT QUALITY INDICES

Automatic control system containing proportional-plus-integral action controller and control object which has interval specified parameters has been considered. Using robust expansion of root-locus method the technique of synthesis of proportional-plus-integral action controller parameters guaranteeing minimal degree of stability and maximal degree of system oscillativity was developed. The technique is based on vertex analysis of root quality indices applying the equation of Theodorchik-Evans. The numeric illustration is given.

UDC 681.51.013

Vadutov O.S.
SYNTHESIS OF DEPRESSED CONTROLLERS BY SPECIFIED ARRANGMENT OF CLOSED SYSTEM POLES

Algorithm of controller synthesis supporting arrangement of closed system dominant poles in specified points and arrangement of nondominant poles in specified area has been suggested. Two-phase algorithm is based on the method of D-partitioning modified with conditions for system poles arrangement and the method of searching the best solution in parameter region which guarantees the desired pole arrangement. The example is given.

UDC 62-50:512

Kartashov V.Ya., Sakhnin D.Yu.
STRUCTURALLY PARAMETRIC IDENTIFICATION OF OBJECT DESCRETE MODELS WITH DELAY FOR TUNING SMITH CONTROLLERS

Construction of Smith digital controller on the basis of equivalence principle of dynamic object models with delay has been suggested.

UDC 681.51

Leschyov V.S., Shilin A.A., Svetlakov A.A.
AUTOMATED SYSTEM FOR STUDYING FEEDBACK CONTROLLERS

Bundled software intended for realization of different control algorithms constructed on the basis of functional units on medium-priced industrial controllers have been considered. The example of programming in a language of functional block diagram of algorithm of real processing automation is given.

UDC 658.012.011.56:681.324

Bogdan S.A., Kudinov A.V., Markov N.G., Rodikevich S.S.
AUTOMATION OF MONITORING IN GAS PRODUCING COMPANY

Specific character of monitoring in gas producing company has been considered. Corporate geoinformation system «Magistral-Vostok» for controlling gas producing enterprises was suggested, the experience of this system introduction in «Vostokgasprom» was described.

UDC 66.012-52

Chursin Yu.A., Goryunov A.G., Liventsov S.N.
AUTOMATED CONTROL SYSTEM OF EXTRACTION COLUMN

Extraction column has been analyzed as a control object; its mathematical description has been developed subject to the peculiarities of processing. On the basis of mathematical description the simulation model of column device was developed. Automated control system was synthesized by re-extract density in pulse column. Estimation of control quality supported by the system was carried out.

UDC 681.3

Chetverikov V.V., Gordievskikh V.V., Malyshenko A.M., Voronin A.V., Galaktionov E.A., Gromakov E.I.
INTEGRATED CONTROL SYSTEM OF PROJECTS OF SCIENTIFIC AND TECHNICAL CENTRE IN OIL COPANY «ROSNEFT»

Concept and structure of three level integrated control system of projects in project-oriented organization have been suggested and described. Synergetic effect at such system introduction is achieved due to systemic actions in such directions as: increasing organization controllability and transparence of decision making; flow of documentation regulation; formalization and optimization of project activity; development of irredundant and consistent system of normative documents in all directions of organization activity.

UDC 519.179.2

Tsapko S.G., Tsapko I.V.
PARALLELISM OF FUNCTIONING LOGICALLY DIVIDED SUBSYSTEMS IN A COMPLEX SYSTEM AT E-NETWORK SIMULATION

Principles of object-oriented simulation have been considered. Applicability of the mathematical simulation device for describing interaction logic of complex system inner components was shown. Comparative analysis of description methods of parametric components in complex system was carried out. The main points of E-network simulation method of interactive processes were given. The example of forming conversion circuit of token attributes on the basis of model E-network graph and functions describing parametric information conversions was shown.

UDC 519.876.2(004.4'22)

Ozerova I.G., Dmitrieva E.A., Tsapko G.P., Vichugov V.N.
TECHNIQUE OF DIAGRAM AUTOMATED CONSTRUCTION IN BUSINESS PROCESS CONTROL SYSTEMS

Technique allowing reducing stages of analysis and projecting the supplement at introducing control Business Process Management System (BPMS) has been suggested. It was possible due to elimination of enterprise activity examination stage and formation of business process models on the basis of structural functional models obtained as a result of reengineering project or developing quality management system. The required steps of models construction in BPMS were revealed. Appropriateness of business process modeling with the help of traditional means with further use of models for transfer into BPMS by means of conversion was validated. Algorithm of automated transformation on the basis of processing XML-file of models was suggested.

UDC 316.455:621.372.852

Stukach O.V.
FACTOR AND REGRESSION MODELING OF THE VARIABLE STATE DEVICES IN THE SYSTEM STATISTICA

For designing the discrete variable state devices the methods of statistical modeling, in particular, the factor and multi-variable regression analysis have been offered to use. It was shown that the statistical methods which were not used earlier for solving the given problem,

allow revealing physical laws of the elements operation in the device that promotes creating the optimal from the point of view of supporting minimum phase shift at controlling transfer constant. Reveal and substantial interpretation of the factor loadings influencing various researched characteristics allow changing traditional methodology and significantly simplifying optimization of correction and regulation parameters in phase-invariance devices. The computer system Statistica 6.0 was used for modeling in the paper.

UDC 004.94

Zaychenko T.N.
STUDYING SIMULATING TECHNIQUES OF THE SYSTEMS WITH DISCRETE TIME AND SOFTWARE TOOLS IN THE SYSTEM MARS

Questions of formalized presentation and simulation of systems with discrete time and software tools in domestic simulation system MARS have been considered. The ways of formalized presentation of discrete systems specified by difference equations and transfer functions and models of algorithm diagram elements are given. The examples of simulating in the system MARS are presented.

UDC 621.38.001:681.3.066

Kutyavina S.K., Arishin E.A., Ivanov I.V.
PROBLEM-ORIENTED APPROACH TO SOLVING THE PROBLEMS OF ELECTRONIC EQUIPMENT DESIGN IN CAD

New approach to electronic equipment design based on ranking by special characteristics and further optimization of printed wire length has been suggested. The example of research works carried out applying the given approach was presented.

UDC 004.67:514.83

Kopnov M.V., Kovin R.V.
RECOVERY OF TWO-DIMENSIONAL GEOFIELDS: PROBLEMS AND SOLUTIONS

Complexities of two-dimensional geofields recovery have been analyzed. The results of investigations and developments in the field of geoinformation systems and technologies for analyzing two-dimensional geofields were given.

UDC 504.064(4)

Burkatovskaya Yu. B., Markov N.G., Morozov A.S., Serykh A.P.
APPLICATION OF JOHNSON DISRIBUTION TO THE PROBLEM OF AEROSPACE IMAGES CLASSIFICATION

Solving the problem of aerospace images classification it was suggested to approximate distribution density of image characteristics by Johnson distribution. The possibilities of such approach were investigated and its availability was shown.

UDC 517.5

Fadeev A.S.
WAVELET-FUNCTIONS FORMATION IN THE PROBLEM OF MUSIC SIGNAL IDENTIFICATION

Approach allowing forming wavelet-functions on the basis of periodic signals and signal fragments of musical instruments has been suggested. The required and sufficient conditions made to the formed wavelet-functions were considered. The experiment allowing identifying some harmonic components of a signal localized in time was described. The possibility of applying the developed approach in the tasks of identifying complex musical signals was shown.

UDC 004.93

Sidorov D.V., Osokin A.N.
SIMPLE ALGORITHM OF WAVELET-COMPRESSSION OF HALFTONE AND COLOUR IMAGES

Simple algorithm of wavelet-compression allowing realizing inexpensive hardware and software platforms for closed circuits and processing systems of high definition television in real time has been developed.

UDC 681.3.06

Pogrebnoy V.K.
MATRIX ALGORITHM OF SOLVING GRAPH CUTTING PROBLEM

Matrix algorithm of solving graph cutting problem has been suggested. The main algorithm points based on matrix graph presentation were considered. Formalization of the main algorithm procedures - defining estimations for selecting relocatable matrix elements and matrix conversion by reciprocal transfer of columns and lines was given. Algorithm operation was considered by the example of data transmission graph between the stations of local computer system network.

UDC 681.3.06

Pogrebnoy A.V., Pogrebnoy G.V.
DESIGNING LOCAL NETWORK STRUCTURE FOR DISTRIBUTED COMPUTER SYSTEM OF REAL TIME

Te task of designing local network structure in distributed computer system of real time has been formulated. The method of problem solving is suggested. It includes construction operations of data transmission graph between network stations, conflict presence matrices at the access to the network backbones, diagrams of combining parallel data transmission. Method description is accompanied by explanations with the examples.

UDC 621.394

Linets G.I.
OPTIMIZATION OF TRANSMISSION LINE CAPACITIES OF CORPORATE NETWORKS USING THE METHOD OF INDIRECT OPTIMIZATION

Analytic dependences allowing defining average minimum time of package delay and realizing substantiated choice of transmission line capacities at the existing matrix of network node gravitations have been obtained.

UDC 621.394.74

Fomin L.A., Linets G.I.
ASSESSMENT OF LOADING SELF-SIMILARITY PROPERTIES IN NETWORK STRUCTURES

Main ratios allowing estimating the influence of self-similar loading on the efficiency of network resource use have been obtained. It was shown that the degree of channel loading increases and buffer storage volume in switching nodes decreases in optimal case by minimum criterion of package delay average time.

UDC 551.576

Kataev M.Yu., Sukhanov A.Ya.
USING NEURAL NETS FOR REDUCING GAS CONCENTRATIONS BY THE DATA OF TRASS GAS ANALYZER AT CO2-LASER

Aspects of neutral network construction and its training for increasing accuracy of gas concentration reduction by measuring data of CO_2-laser trass gas analyzer have been considered. Accuracy of reducing atmospheric gas (H_2O, CO_2 и O_3) concentration by neural network method in comparison with traditionally used method of least square is given.

UDC 519.2+551.510.534

Kashkin V.B.
APPLICATION OF SINGULAR VALUE SPECTRAL ANALYSIS FOR EXTRACTING WEAKLY DEFINED TRENDS

The peculiarities of new method of analysis of time series – singular value spectral analysis have been considered, advantages of the method and problems connected with it application have been discussed. To increase the accuracy of trend extraction and elimination of edge effects the prediction of the series in both ends was suggested to be used. The singular value spectral analysis was applied to time series of satellite data of total ozone in latitude rings from 40 to 600 in Northern and Southern hemispheres. The trends were found. It was shown that for 1998-2005 in this ring the total ozone decreases by

0,38 %±0,01 % per year in Northern hemisphere and by 0,10 %±0,01 % per year in Southern hemisphere. It is no wonder because the most part of ozone damaging substances are produced in middle latitudes of Northern hemisphere.

UDC 004.93'12

Afonasenko A.V.
IDENTIFICATION OF STRUCTURED SYMBOLS ON THE BASIS OF MORPHOLOGICAL ANALYSIS METHODS

Identification technique of structured symbols on the basis of morphological analysis methods has been considered. The developed method allows increasing identification reliability in the conditions of scaling, orientation and symbol collineation.

UDC 004.89

Stoyanov A.K., Panov V.A.
APPLICATION OF CELLULAR AUTOMATON IN PRODUCTION EXPERT SYSTEM

The possibility of applying cellular automaton in production expert systems has been studied. For industrial expert systems having knowledge bases of several thousands rules, using cellular automaton as inference machines opens the possibility to increase the efficiency of operating with knowledge bases.

UDC 656.56

Zykov D.D., Shelupanov A.A.
STUDYING THE SYSTEM OF PIPE HEADER TELEMECHANICS ON THE BASIS OF COMMUNICATION NETWORK OF GSM STANDARD

Studying the system of pipe header telemechanics on the basis of communication network of GSM standard has been covered, the results of experiments for two services of GSM have been given. The way of increasing system response speed is suggested and GSM comparison with other services applied at the moment in pipe header telemechanics systems are given.

UDC 519.23:578.087.1

Fokin V.A.
STATISTIC DATA SIMULATION AT ESTIMATION OF BIOLOGICAL SYSTEM STATE

It has been shown by the method of statistic data simulation that using samples of small volume characterizing reference state of biological systems results in overstatement of weight degree of state integral estimation. It was stated that using asymptotic integral estimations obtained at unlimited increase of modeling reference sample volume is effective as integral estimation of biological system state.

UDC 681.3.06:518.5.001.57:612.821.7

Zakharov E.S., Kravchenko P.P., Skomorokhov A.A.
TECHNIQUE OF AUTOMATED GRAM CONSTRUCTION

The technique of automated dream stage recognition and gram construction has been considered. For partition of initial polysomnogram by segments obtained as a result of patient dream monitoring the signal energy is analyzed using nonlinear energy controller. Frequency weighted energy is calculated for all registered signals then averaging and segmentation according to monitored signals behavior occurs. Secondary index vector which is used at transition from segments to fixed duration periods is formed for segments. One or another dream stage is finally assigned to the period by correlation analysis. Accuracy of the developed algorithm is connected with quantity of considered secondary indices, maximally detailed description of dream stage characteristics and realization of training by manually prepared examples.